

# Maintenance Rating Program Monroe Expressway

**Quarter 3 MRP Assessment** 







**November 2024** 

#### CONSULTANT CERTIFICATION OF COMPLETION

November 12, 2024

Alan Shapiro, P.E. Director of Highway Operations, NCTA 1 South Wilmington Street Raleigh, NC 27601

NCTA Monroe By-Pass Roadway Maintenance Performance Rating Program; Q3, 2024 Rating

This is to certify that I, <u>Caroline Dickey, PE</u>, am an authorized official representative of the company Mott MacDonald I&E, LLC, a subconsultant to HNTB North Carolina, P.C. Collaboratively; we are working as the NCTA Roadway and Facility Maintenance Performance Rating Program Consultants.

I know of my own personal knowledge, and do hereby certify, that the work of the contract described above has been independently performed in accordance with, and in conformity to, the NCTA Roadway and Facility Maintenance Performance Standards v.7.1.

Sincerely,

Mott MacDonald I&E, LLC

Caroline Dickey, PE Asset Management Engineer

1101 Haynes Street, Suite 101 Raleigh, NC 27604

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# 1.0 Executive Summary

The North Carolina Turnpike Authority (NCTA) Maintenance Rating Program (MRP) is a maintenance evaluation program for all roadway features and toll facilities on the Monroe Expressway. This report presents results from the 2024 Third Quarter Assessment of the Monroe Expressway.

The overall 2024 Third quarter rating of the Monroe Expressway was 97.9 This score is above the target rating score of 90 for the overall system. As shown in Table 1, all five elements assessed achieved a rating greater than the target rating of 85.

Table 1: MRP Element Results for the 2024 Third Quarter Assessment

Element	MRP Rating	Target Rating
Road Surface	100.0	85.0
Unpaved Shoulders and Ditches	98.7	85.0
Drainage	95.6	85.0
Roadside	98.4	85.0
Traffic Control Devices	96.8	85.0
Overall MRP Performance Rating	97.9	90.0

This report also provides a rolling rating of the latest four quarterly inspections of the Monroe Expressway. As presented in *Table 2*, the rolling maintenance rating of the Monroe Expressway was 97.1.

**Table 2: MRP Rolling Element Results** 

Element	Q4 2023 Rating	Q1 2024 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Road Surface	95.7	98.5	98.8	100.0	98.2
Unpaved Shoulders and Ditches	97.0	96.5	100.0	98.7	98.1
Drainage	96.1	97.8	95.3	95.6	96.2
Roadside	96.5	96.5	98.2	98.4	97.4
Traffic Control Devices	96.0	95.5	95.7	96.8	96.0
Overall MRP Performance Rating	96.2	96.9	97.4	97.9	97.1

All the element ratings were above the desired rating of 85. It is important to note that these results are only representative of the Third quarter sample, one of four quarterly surveys annually that provide an intermediate snapshot of seasonal conditions. Therefore, these results are not yet a statistically valid representation of the assets; only the total of all four quarterly inspections reported as a rolling rating, provides a 95% confidence level in statistical sampling.

## 2.0 Introduction

The North Carolina Turnpike Authority (NCTA) Maintenance Rating Program (MRP) is a maintenance evaluation program for roadway features and toll facilities on the NCTA system. It is a comprehensive planning, measuring, and managing process that provides a means for communicating to managers, stakeholders, and key customers the impacts of policy and budget decisions on program service delivery.

Using outcome-based performance measures and the service level scale (0 through 100), the survey results are rated against established threshold criteria. The program analysis is accomplished by implementing sampling procedures that capture the level of service being provided for individual asset features. Over time, these ratings will be charted to identify work needs and subsequent necessary actions. The evaluations are based on the establishment of "threshold" conditions that quantify the maximum defect allowed to exist for a characteristic before it is considered unacceptable.

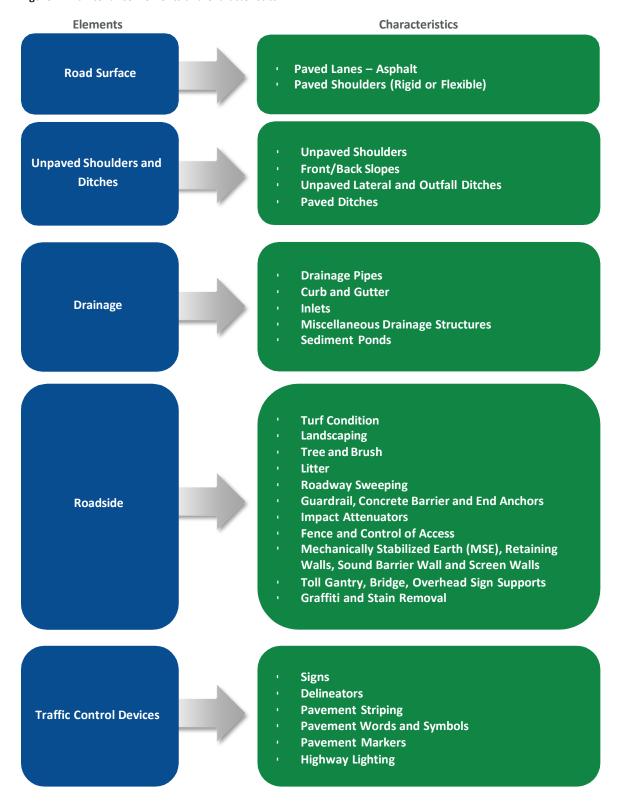
The NCTA performance standards, threshold criteria, and maintenance rating program were developed through a collaborative effort by NCTA managers, NCDOT maintenance staff, and consultants.

Using this field survey information, a maintenance matrix can be developed to show ties between maintenance activities and the characteristics of various roadway features. The purpose of this evaluation is to provide information that will be used to schedule and prioritize routine maintenance activities and provide uniform maintenance conditions that meet established objectives.

# 3.0 MRP Survey Procedure

Per the NCTA Roadway and Facility Maintenance Performance Standards, roadway assets on NCTA facilities have been grouped into characteristics which are categorized into 5 elements. These elements and their characteristics can be seen in *Figure* 1 below:

Figure 1: Maintenance Elements and Characteristics



Because some roadway characteristics are of greater importance than others, a weighting system is applied to enable rational calculation of an overall level of service rating. Although one set of weighting factors for all characteristics could serve this purpose, a more useful system consists of two sets of weighting factors: one set that accounts for the importance of individual characteristics within a given maintenance element (1-9), and another set that accounts for the importance of the maintenance elements to the total rating (by % of score). This two-set system reveals deficiencies among characteristics and shows which maintenance elements are deficient.

The program analysis is accomplished using statistically valid, random sampling procedures that capture the level of service for individual assets with a 95% confidence level in sampling. Inspections are performed during the months of February, May, August, and November to account for dynamic changes in assets during the various seasons, such as vegetation growth. Each maintenance characteristic is evaluated and recorded according to the criteria developed by the NCTA performance standards. This inventory was completed with electronic data collection tablets and programs for accurate GPS coordinates of each transportation asset.

The evaluations are based on established "threshold" conditions that quantify the maximum defect allowed to exist for a characteristic before it is considered unacceptable. The ratings are done by comparing existing field conditions to the "threshold" value. If the characteristic meets or exceeds the "threshold," it is coded as YES to meeting the criteria. If it does not meet the criteria, it is coded as a NO. When the survey is complete, the number of YES's and NO's are totaled, and a composite number (using from 1 to 100 scale) is produced, which represents the level of maintenance currently being provided.

For any given asset, the number assigned as the target level of service represents the percentage of random samples in which the maintenance condition standard corresponding to the activity is to be met or exceeded. For instance, an activity with a level of service rating of 83 means that 83 percent of the sites met the condition standards.

The NCTA's overall target rating score is 90, with each element level scoring at or above 85 and every characteristic at or above 80.

# 4.0 Monroe Expressway Description

The Monroe Expressway extends for approximately 18.5 miles between the U.S. 74 interchange to the west and U.S. 74 near Marshville to the east. The Monroe Expressway consists of eight interchanges and seven all-electronic toll collection zones. A map of the Monroe Expressway can be seen in *Figure* 2 below:



Figure 2: Monroe Expressway Map

# 5.0 Survey Results

The overall Q3 2024 MRP rating for the Monroe Expressway is 97.1. This score is above the target rating score of 90 for the overall system. All the element ratings were above the desired rating of 85, and one characteristic scored below the minimum 80 rating. Individual characteristic ratings will be discussed in detail in the analysis section of this report.

Appendix A shows each of the individual assets that failed the MRP criteria. Appendix B includes maps of each of the individual asset locations that failed to meet the criteria displayed in the tables below. The MRP rating value designated to each element and feature refers to the percentage of elements or features that pass the asset's particular threshold criteria. After developing an inventory by recording the total number of instances of a particular feature, each feature is analyzed based on threshold criteria and a pass/fail result is designated and recorded for each to determine the percentage of the sample passed. The passing samples and sample totals are then multiplied by their weighted value, which are designated to each element based on importance to determine the actual and available rating points. Lastly, an MRP Performance Rating is calculated for each asset and element group based on the ratio of the actual points over the available points.

The overall MRP Performance rating results of the survey are presented in Tables 3 and 4.

Table 3: Element Results for Q3 2024

Element	MRP Rating
Road Surface	100.0
Unpaved Shoulders	98.7
Drainage	95.6
Roadside	98.4
Traffic Control Devices	96.8
Overall MRP Performance Rating	97.9

The overall score is determined by summing the elements multiplied by weighted factors as follows: Road Surface (25%), Unpaved Shoulders (13%), Drainage (15%), Roadside (17%), and Traffic Control Devices (30%).

Table 4: Characteristic Results for Q3 2024

Road Surface	Sample Passed	Sample Total	Weighted Values	Actual PTS	Available PTS	Quarter Rating
Paved Lanes Asphalt	30	30	9	270	270	100
Paved Shoulder	30	30	5	150	150	100
Element Total				420	420	100.0
Unpaved Shoulders & Ditches	Sample Passed	Sample Total	Weighted Values	Actual PTS	Available PTS	Quarter Rating
Unpaved Shoulder	29	30	9	261	270	97
Front/Back Slopes	30	30	6	180	180	100
Lateral and Outfall Ditches, Unpaved	30	30	6	180	180	100
Ditches, Paved	8	8	5	40	40	100
Element Total				661	670	98.7
Drainage	Sample Passed	Sample Total	Weighted Values	Actual PTS	Available PTS	Quarter Rating
Drainage Pipes	32	32	7	224	224	100
Curb and Gutter	24	24	6	144	144	100
Inlets	28	31	7	196	217	90
Misc. Drainage Structure	16	18	4	64	72	89
Sediment Pond	2	2	7	14	14	100
Element Total				635	664	95.6
Roadside	Sample Passed	Sample Total	Weighted Values	Actual PTS	Available PTS	Quarter Rating
Turf Condition	30	30	7	210	210	100
Landscaping	15	15	4	60	60	100
Trees and Brush	14	15	4	56	60	93
Litter	30	30	4	120	120	100
Roadway Sweeping	30	30	5	150	150	100

Guardrail, Concrete Barrier and End Anchors	18	18	9	162	162	100
Impact Attenuators	5	6	9	45	54	83
Fence, Control Access	29	30	7	203	210	97
Retaining Walls and Sound Barrier Walls	14	14	5	70	70	100
Toll Gantry Supports	10	10	5	50	50	100
Graffiti and Stain Removal	30	30	4	120	120	100
Element Total				1246	1266	98.4

Traffic Control Devices	Sample Passed	Sample Total	Weighted Values	Actual PTS	Available PTS	Quarter Rating
Signs	28	32	7	196	224	88
Object Markers and Delineators	30	30	3	90	90	100
Pavement Striping/Marking	30	30	8	240	240	100
Words and Symbols	31	31	7	217	217	100
Pavement Markers	30	30	9	270	270	100
Highway Lighting	2	3	6	12	18	67
Element Total				1025	1059	96.8

# 6.0 Analysis & Recommendations

#### **MRP Elements**

During the Third quarter, all elements exceeded NCTA's quarter score threshold criteria of 85. All elements received a quarter score above 90.

#### **MRP Characteristics**

Most characteristics exceeded the NCTA minimum threshold criteria of 80. This section identifies characteristics that did not achieve the minimum targeted score.

#### **Highway Lighting**

Highway Lighting scored a 67 in the survey due to one sample failure out of three total samples. Deficiencies of highway lighting were directly related to functional damage. The MRP Maintenance and Evaluation Standards V7 are below.

Highway Lighting - All highway lighting maintained is to be included in the survey. The daytime evaluation should be for missing or damaged poles and missing or damaged luminaries. Any electrical inspection plate, access panel cover or pull box cover that is not properly secured in place will also cause this characteristic not to meet the desired maintenance conditions. If this characteristic meets the desired daytime conditions, then a nighttime evaluation shall be made. Highway Lighting also includes Bridge Lighting and Associated Hardware and "Lighted Tubes" used for Traffic Delineation.

Sign Lighting - Illumination of overhead roadway signs may be by means of: a light illuminating the message through translucent material, a source that illuminates the entire face of the sign, or some other source such as illuminated tubing or incandescent panels that make the message visible at night. Sign illumination that is present but not functioning should be verified as officially out of service.

Maintenance and Evaluation Standards: Highway and Sign Lighting do not meet the maintenance standards when any of the following criteria is observed:

- 1) Any electrical inspection plate, access panel cover, exposed electrical wire or pull box cover are not properly secured in place.
- 2) The luminaries are not functioning during nighttime observation. (N)
- 3) Any pole is damaged, leaning or missing.
- 4) Rodent screen protection is not in place, where applicable.

# 7.0 Current Rolling MRP Rating

The rolling maintenance rating of the Monroe Expressway was 97.1, exceeding NCTA's overall target rating of 90. All elements exceeded NCTA's rolling rating threshold criteria of 85. All characteristic rolling ratings met or exceeded the target rating of 80.

The 2023/2024 results are presented in Exhibit 1 and Table 5. These results are a collection of the latest four quarterly inspections.

Exhibit 1: MRP Element Results for 2023/2024

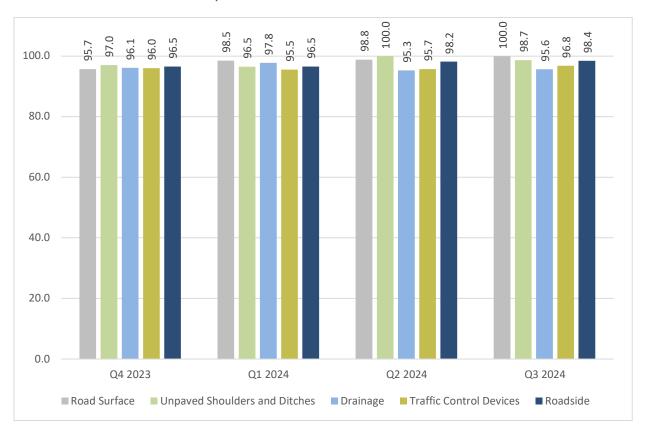


Table 5: MRP Rolling Element Results

Road Surface	Q42023 Rating	Q1 2024 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Paved Lanes Asphalt	93	100	100	100	98.2
Paved Shoulder	100	96	97	100	98.2
Element Total					98.2
Unpaved Shoulders and Ditches	Q4 2023 Rating	Q1 2024 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Unpaved Shoulder	97	96	100	97	97.4
Front/Back Slopes	97	96	100	100	98.2
Lateral and Outfall Ditches, Unpaved	100	100	100	100	100
Ditches, Paved	88	92	100	100	94.9
Element Total					98.1
Drainage	Q4 2023 Rating	Q1 2024 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Drainage Pipes	96	100	100	100	99.2
Curb and Gutter	96	100	100	100	99.0
Inlets	97	97	87	90	92.6
Sediment Basins	100	100	100	100	100
Misc. Drainage Structure	94	89	94	89	91.7
Element Total					96.2
Roadside	Q4 2023 Rating	Q1 2024 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Turf Condition	93	91	100	100	95.9
Landscaping	93	100	100	100	98.2
Trees and Brush	100	100	100	100	98.5
Litter	97	100	100	100	99.1
Roadway Sweeping	100	100	100	100	100
Guardrail, Concrete Barrier, and End Anchors	100	100	100	94	99.0
Impact Attenuators	100	100	100	100	96.0
Fence, Control Access	88	90	90	93	92.0
Retaining Walls and Sound Barrier Walls	100	93	100	100	98.2
Decorative Supports	94	100	100	100	97.8
Graffiti and Stain Removal	100	100	100	100	100
Element Total					97-4
Traffic Control Devices	Q42023 Rating	Q1 2023 Rating	Q2 2024 Rating	Q3 2024 Rating	Rolling Rating
Signs	88	91	90	88	89.0
Delineators	100	100	97	100	99.1
Pavement Striping/Marking	100	100	100	100	100
Words and Symbols	94	90	97	100	95.2
Pavement Markers	100	100	97	100	99.1
Highway Lighting	100	100	67	67	83.3
Element Total					96.0

## 8.0 Conclusion

This report presents the 2024 Third quarter assessment of the Monroe Expressway. The NCTA's target ratings are 90 for the rolling rating, 90 for the overall quarter rating, 85 for elements, and 80 for characteristics. The Third quarter rating was 97.9 and the rolling rating was 97.1, both ratings met the target rating of 90.

All element ratings were above the target ratings for the quarter. During the Third quarter assessment, all characteristics but one met or exceeded the target rating of 8o.

The maintenance provider is encouraged to continue using asset management principles and a performance management approach to work planning.

# Appendix A

Monroe Expressway 2024 Third Quarter Table Results of Assets Failing MRP

### Appendix A: Monroe Expressway 2024 Third Quarter Table Results of Assets Failing MRP

Provided below are a series of tables outlining the existing failures that occurred throughout the facility. Assets are defined by an Inventory ID, which is a unique identifier given to each individual asset. The components of the Inventory ID are an asset specific prefix along with a number, such as LS\_1. The Inventory ID and GIS Reference Page number correspond to the provided map packets and allow for quick location of particular asset failures. Photos of failures were provided when applicable.

All assets and their respective prefixes are listed below:

Guardrail, Concrete Barrier and End Anchors (BR)	2
Curb and Gutter (CG)	3
Toll Gantry Supports (GN)	4
Drainage Pipes (DP)	5
Misc. Drainage Structure (MDD)	6
Fence and Control of Access (FN)	7
Graffiti (GR)	8
Highway Lighting (HL)	9
Impact Attenuators (IA)	10
Inlets (IN)	11
Landscaping (PB)	12
Paved Lanes – Asphalt (LS)	13
Paved Shoulders (LS)	14
Unpaved Shoulders (LS)	15
Front/Back Slopes (LS)	
Unpaved Lateral and Outfall Ditches (LS)	17
Litter (LS)	18
Roadway Sweeping (LS)	19
Pavement Striping (LS)	20
Pavement Markers (LS)	21
Delineators (LS)	22
Paved Ditches (PD)	
Pavement Words and Symbols (PS)	24
Signs (SN)	25
Signs (SN)	26
Tree and Brush (TB)	27
Turf Condition (TF)	28
MSE/Retaining Walls, Sound Barrier Walls and Screen Walls (WL)	29
Sediment Basins(SB)	30

# Guardrail, Concrete Barrier and End Anchors (BR)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Steel	BR_563	Missing Part		B17

# Curb and Gutter (CG)

#	Material	Object	Failure Type	Photo	GIS Reference
	Type	ID	ганоге туре	Filoto	Page

This asset did not produce any failures.

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# Toll Gantry Supports (GN)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
					ı agc

# Drainage Pipes (DP)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Misc. Drainage Structure (MDD)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Concrete	MDD_70	Blockage		B10
2	Concrete	MDD_138	Missing Grate	No Photo Provided	B24

# Fence and Control of Access (FN)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Woven	FN_310	Functional Damage		В4

## Graffiti (GR)

# Material Object # Type ID	Failure Type	Photo	GIS Reference Page
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# Highway Lighting (HL)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Steel	HL_1	Functional Damage		B11

# Impact Attenuators (IA)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Steel	IA_11	Functional Damage		B24

## Inlets (IN)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Concrete	IN_150	Erosion	7 8 9 1011 <sup>2</sup> 13 14 15	B22
2	Concrete	IN_172	Erosion		B21
3	Concrete	IN_945	Erosion	1 1 1 20 21 22 23 23 23 23 23 23 23 23 23 23 23 23	B20

# Landscaping (PB)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Paved Lanes – Asphalt (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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## Paved Shoulders (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Asphalt	LS_214	Shoulder Buildup		В7

# Unpaved Shoulders (LS)

# Materi	•	Failure Type	Photo	GIS Reference Page
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# Front/Back Slopes (LS)

#	Material	Object	Failure Type	Photo	GIS
	Type	ID		Photo	Reference Page

# Unpaved Lateral and Outfall Ditches (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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## Litter (LS)

#	Material	Object ID	Failure Type	Photo	GIS Reference
	Type				Page

# Roadway Sweeping (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Pavement Striping (LS)

# Material Object Failure Type Photo R	GIS Reference Page
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# Pavement Markers (LS)

# Material Object Failure Type Photo I	GIS Reference Page
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# Delineators (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Paved Ditches (PD)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Pavement Words and Symbols (PS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# Signs (SN)

#	Sign Type	Object ID	Failure Type	Photo	GIS Reference Page
1	US-74 Toll	SN_214	Sign Height		В4
2	Turn Right	SN_430	Sign Height	MUST TURN RIGHT	В7
3	Mile marker	SN_713	Sign Support		B15

### Signs (SN)

#	Sign Type	Object ID	Failure Type	Photo	GIS Reference Page
4	Wrong Way	SN_862	Sign Height	The state of the s	B22

### Tree and Brush (TB)

#	Sign Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Tree	TB_72	Hazard		Bı

# Turf Condition (TF)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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# MSE/Retaining Walls, Sound Barrier Walls and Screen Walls (WL)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
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### Sediment Basins(SB)

# .	aterial Type	Object ID	Failure Type	Photo	GIS Reference Page
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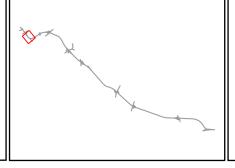
Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations













Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations









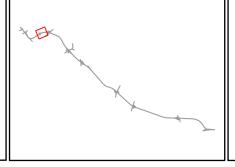
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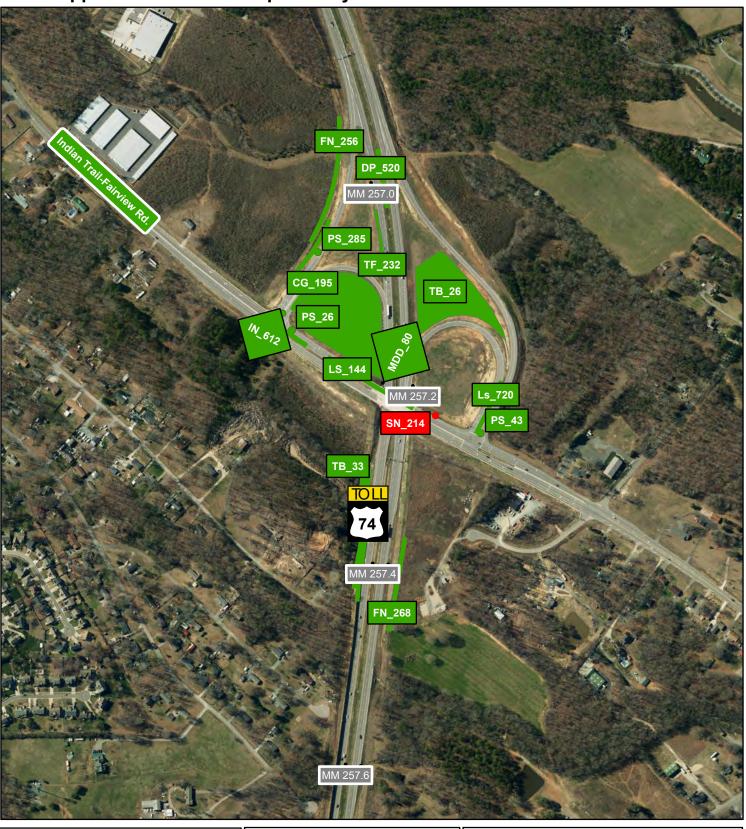








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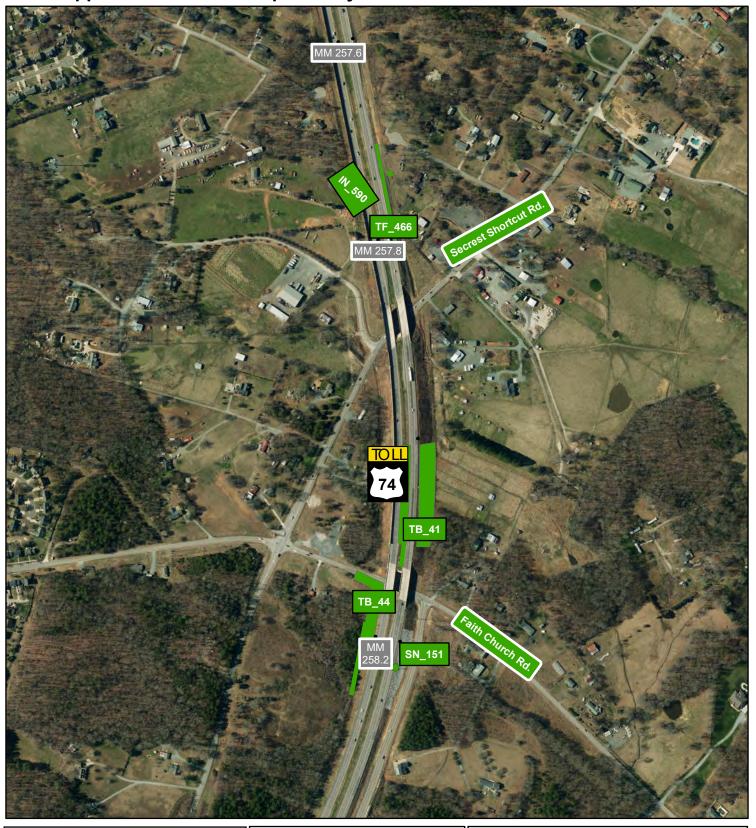




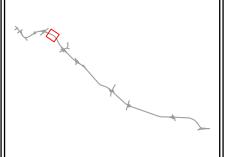




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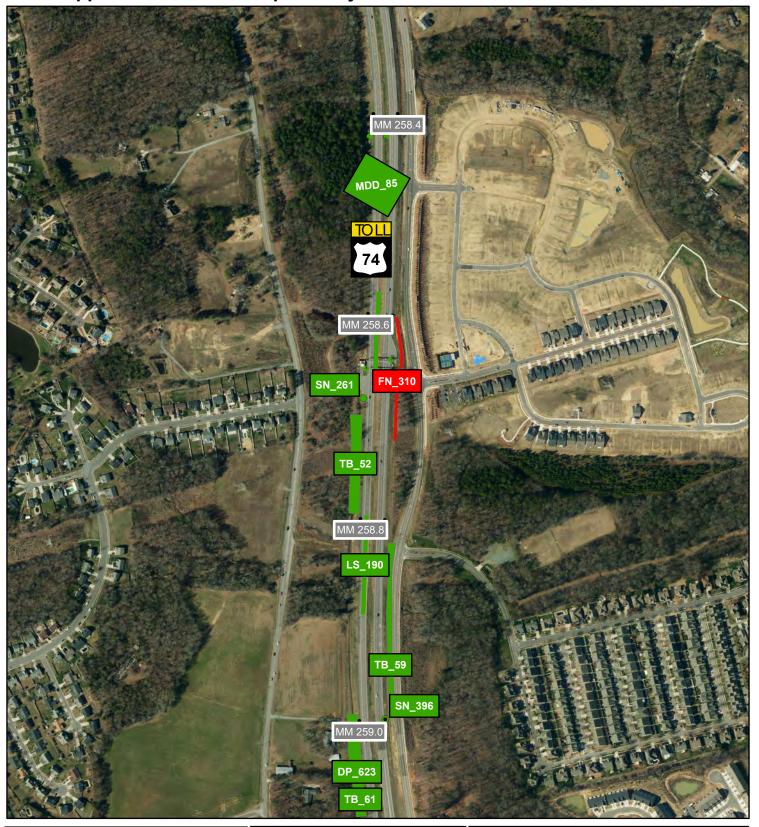








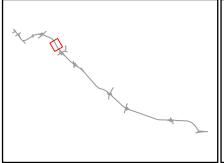
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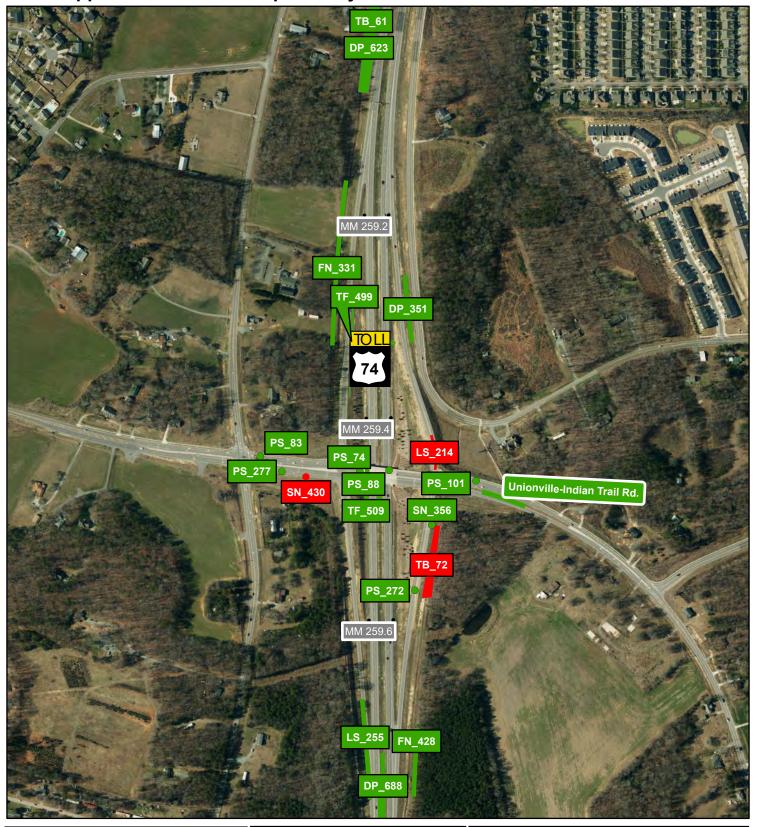








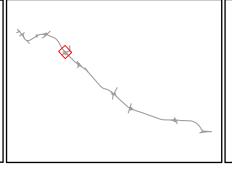
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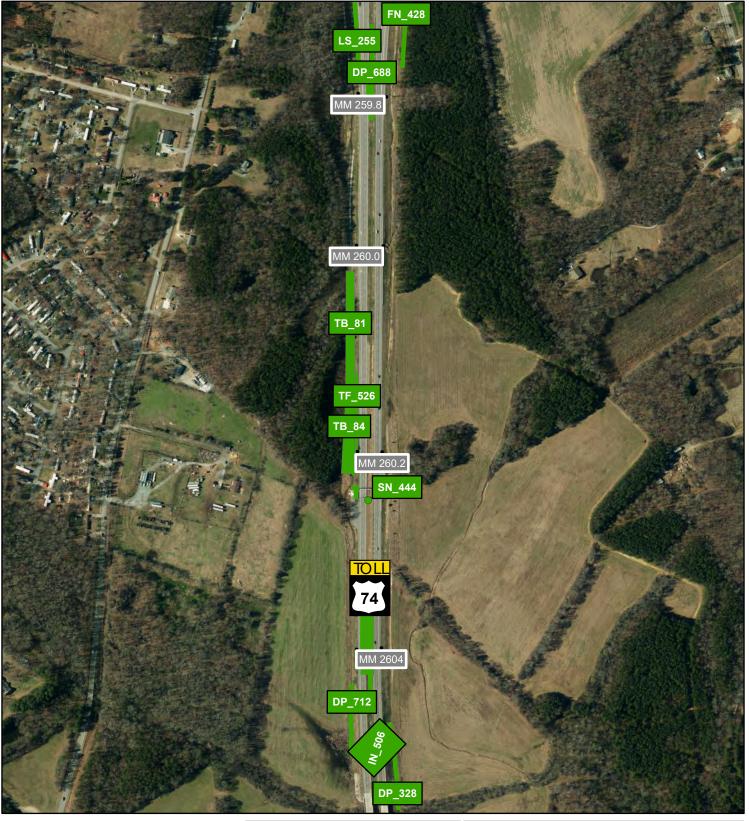




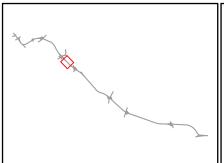




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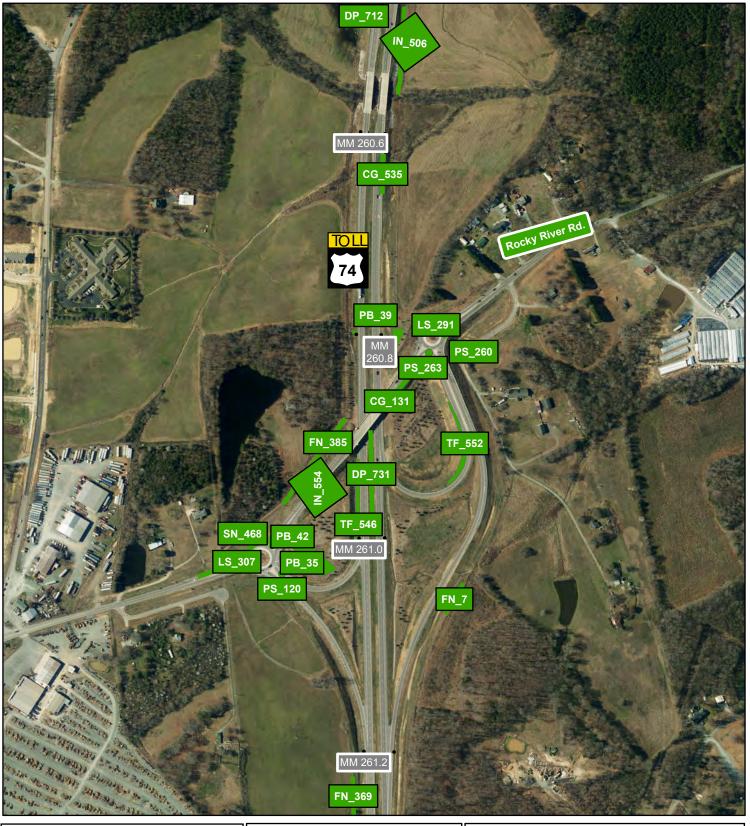




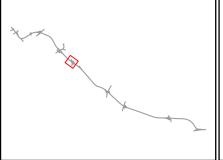




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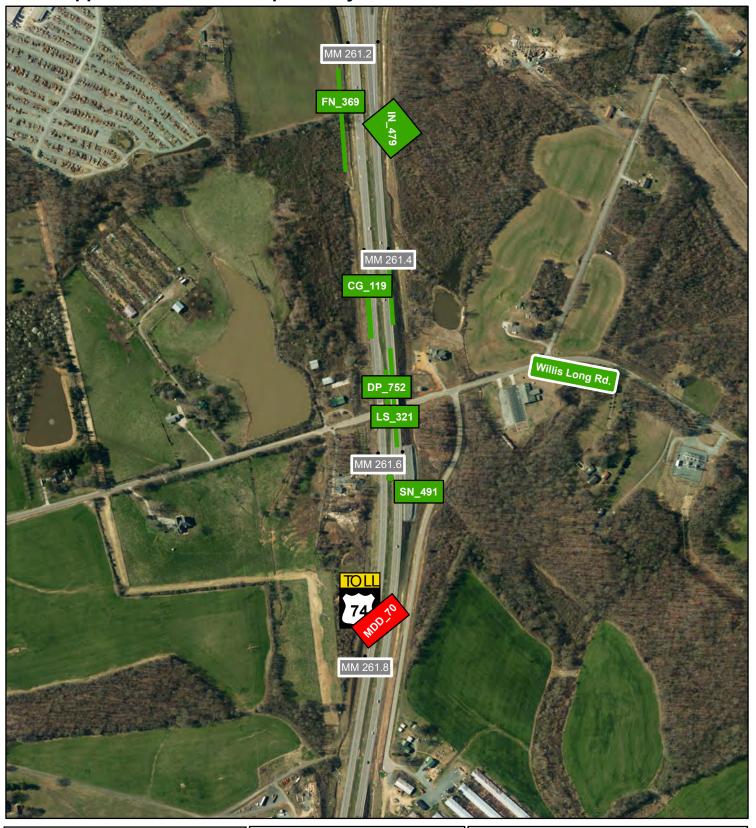








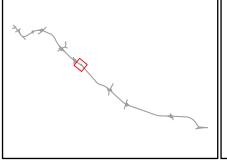
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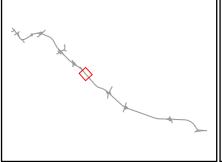
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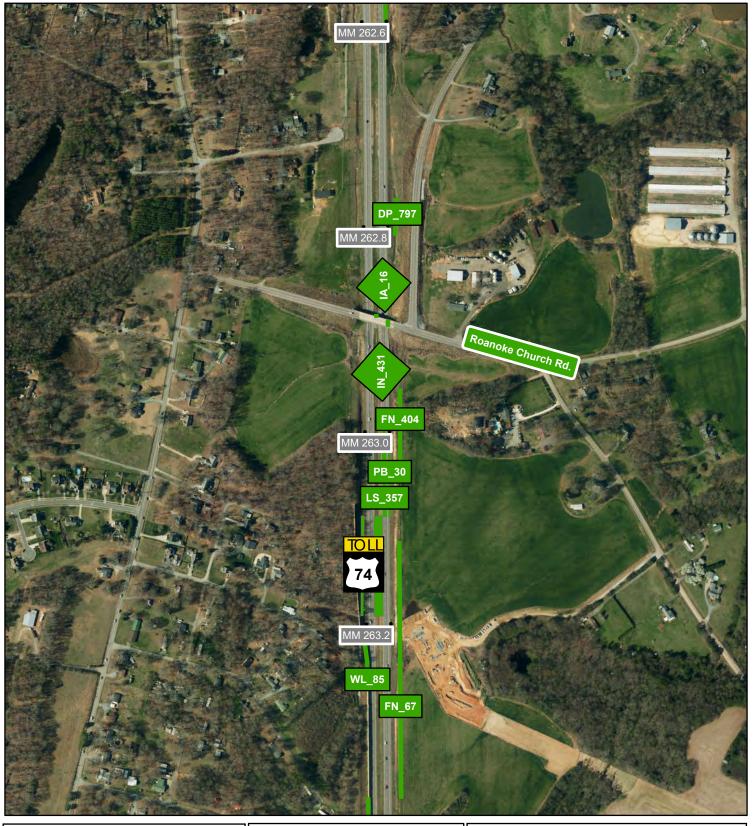




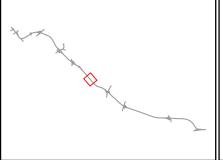




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

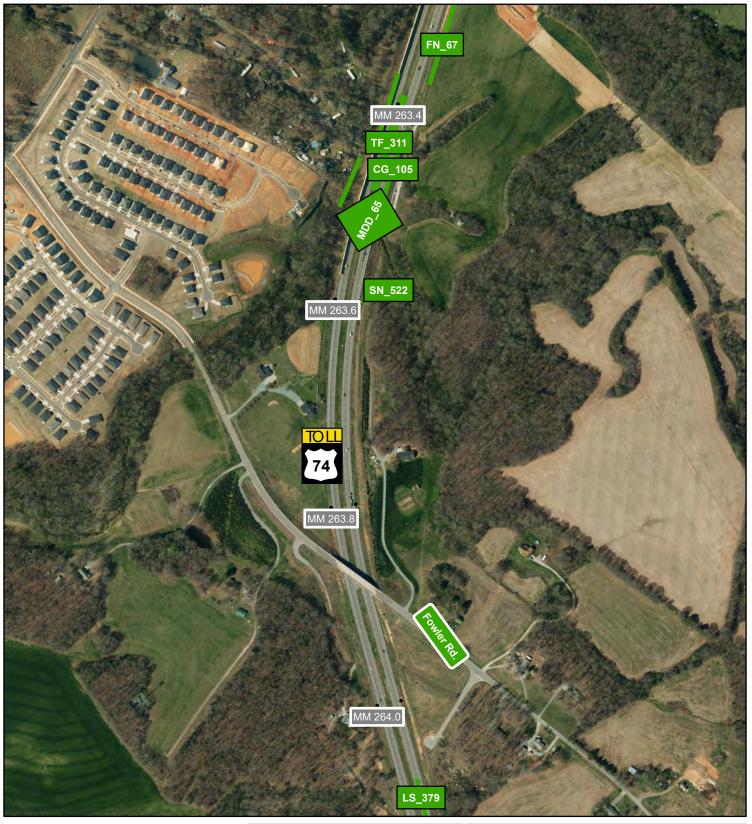


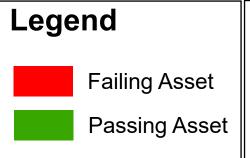


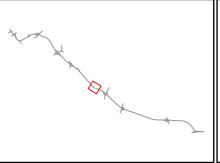




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations



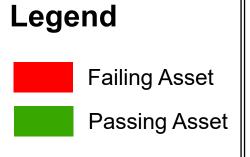


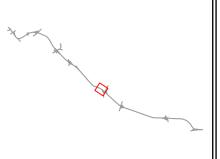




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations



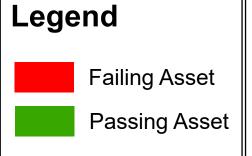


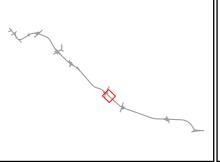




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations



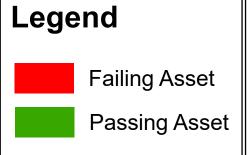


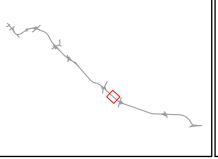




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations





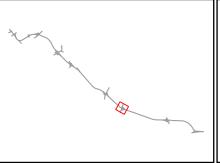




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

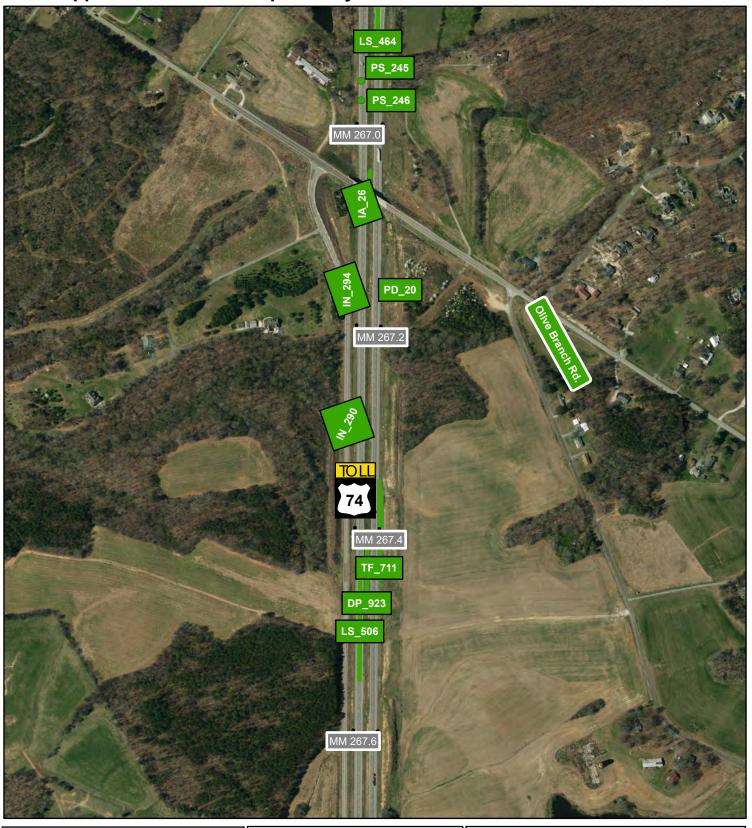


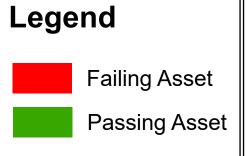


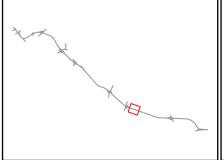




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

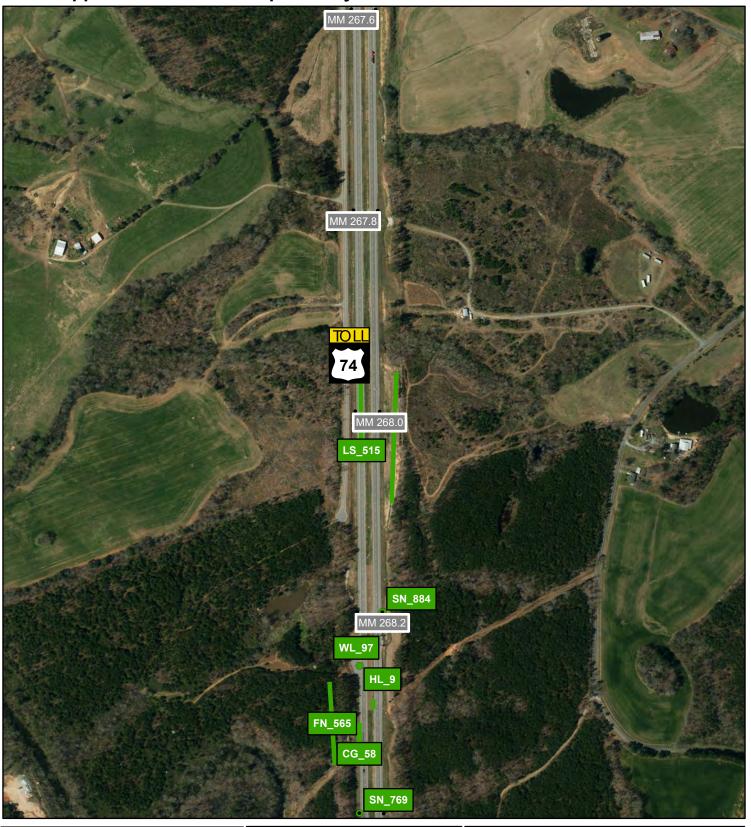


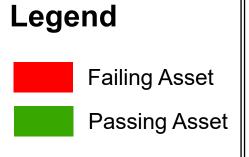


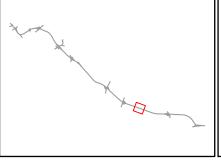




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

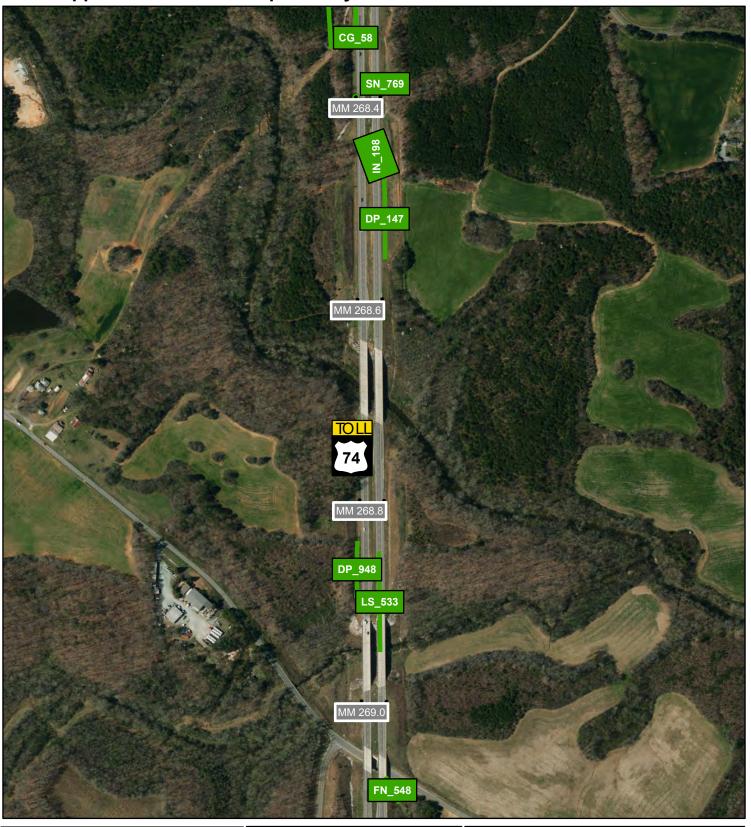




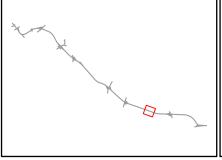




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

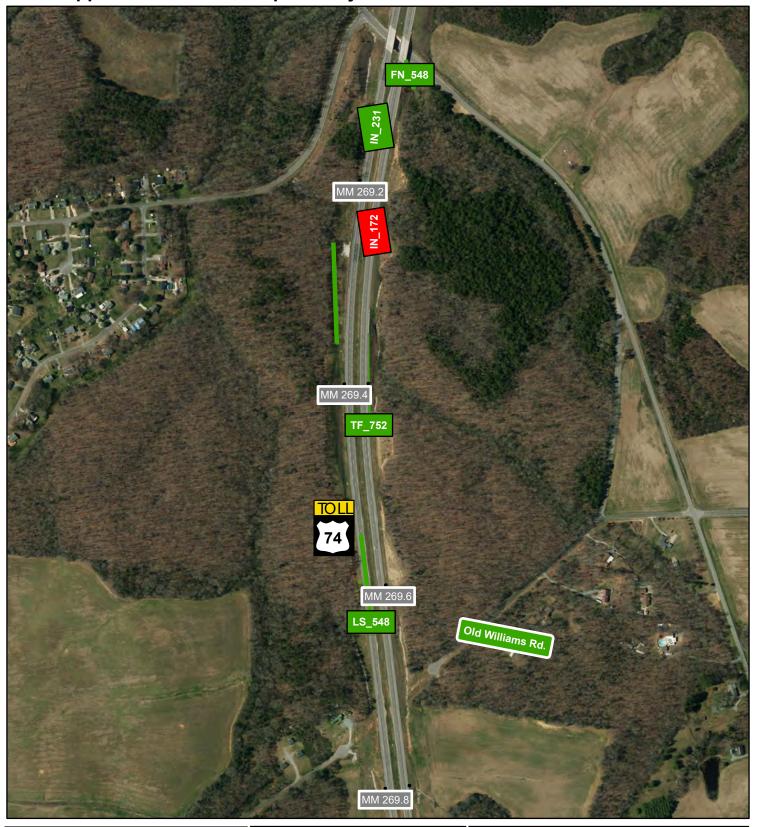








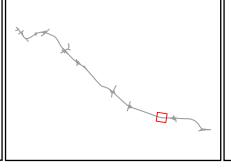
Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations





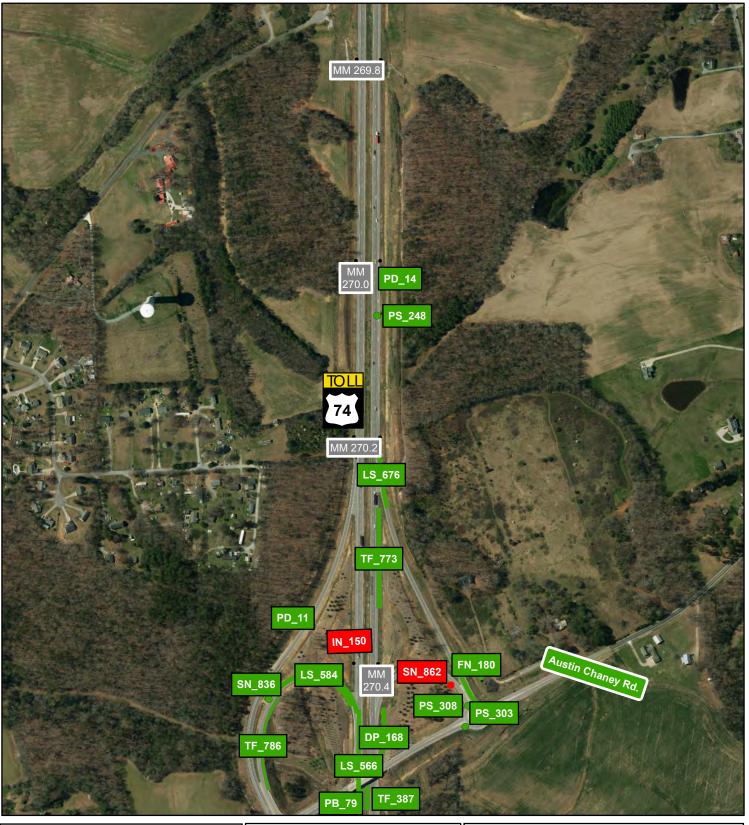




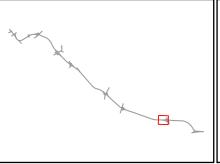




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

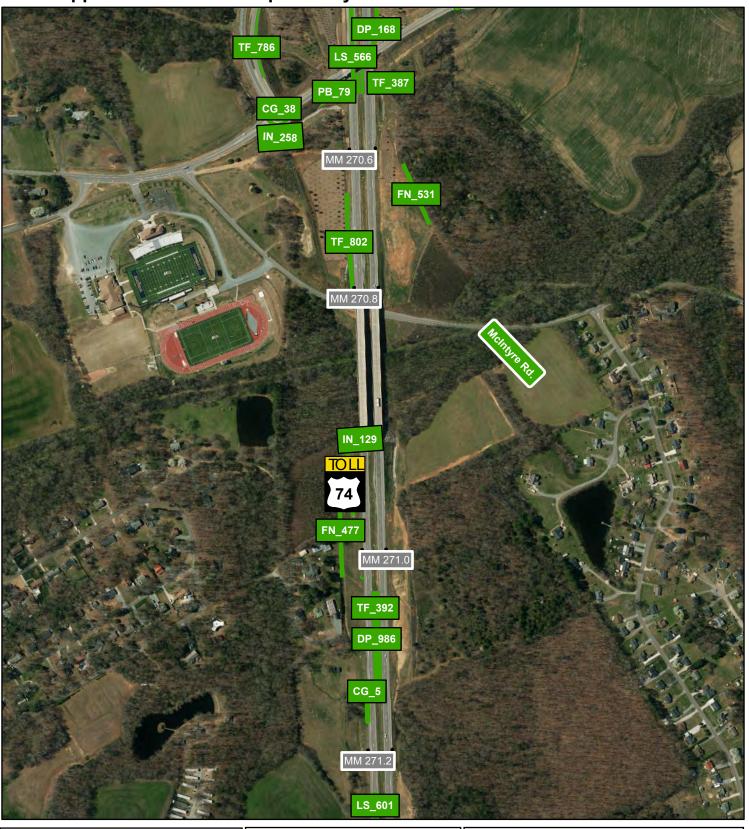


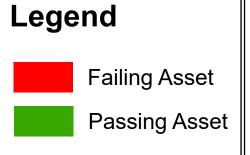


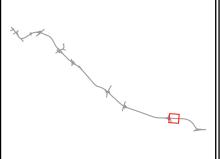




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

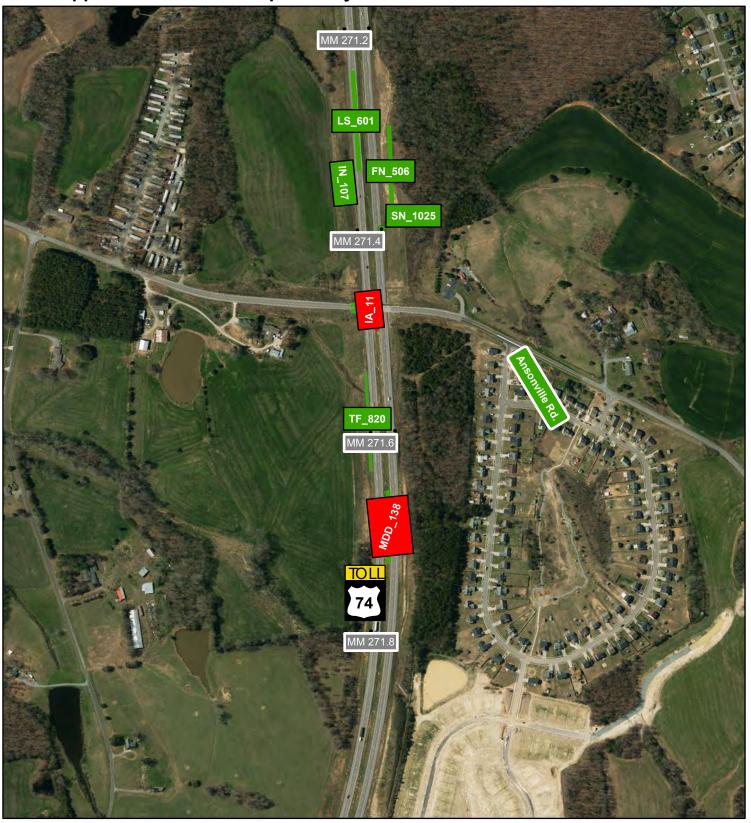








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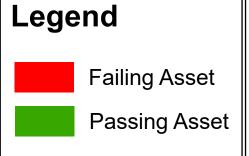


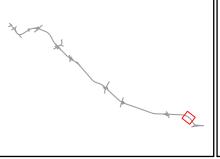




Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations









Appendix B: Monroe Expressway MRP Q3 2024 Assessment Locations

